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Seventeenth Annual Report of the  
State Entomologist  
of Montana



The Alfalfa Weevil, a serious pest of alfalfa, which has spread northward from Utah until it has now appeared on the Montana boundary in Idaho.

BY  
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## Seventeenth Annual Report of the State Entomologist of Montana

### INSECT PESTS OF 1919.

#### THE MITES AND TICKS (ACARINA).

**Red Spider** (*Tetranychus bimaculatus* Harvey). There was the usual number of reports of injury from this pest to raspberry and currant bushes. Beans in eastern Montana suffered somewhat from red spider attack.

**Pear-Leaf Blister Mite** (*Eriophyes pyri* Pagnat). In general the fruit crop of the Bitter Root Valley suffered less injury from this pest during the past year than for several years previously.

#### GRICKETS AND GRASSHOPPERS (ORTHOPTERA).

**Black Cricket** (*Gryllus assimilis* Stew.). This common black cricket was again present in Big Horn county. It was also reported injurious in Rosebud and Yellowstone counties where it was combated with poisoned bran mash the same as used for grasshoppers. The best results were obtained when the arsenical content was increased somewhat over the standard amount.

**Warrior or Yellow-Winged Grasshopper** (*Camnula pellucida* Scudd.). In ten counties of the state this grasshopper occurred in enormous numbers and during the latter part of the summer the State Entomologist's forces gave their entire time to aiding farmers to save their grain fields from this insect. Lack of sufficient money for traveling prevented a greater service to the state.

**Big-Headed Grasshopper** (*Aulocara elliotti* Thom.). In recent years the big-headed grasshopper has not caused much difficulty, but during 1919 it was encountered in great numbers in Gallatin, Beaverhead, and Madison counties, where it was doing damage to grasses.

## THE TRUE BUGS, PLANT LICE, ETC. (HEMIPTERA).

**Box Elder Bug** (*Leptocoris trivittatus* Say.). This insect ordinarily confines itself to the box elder but was reported to have injured fruit in the vicinity of Joliet.

**Cottony Maple Leaf-Scale** (*Pulvinaria acericola* Walsh & Riley). This louse has been known to be present on shade trees in the cities of Missoula and Kalispell for some years but during the present season there was a great increase and injury was reported.

**Bedbugs** (*Cimex lectularius* Linn.). More than the normal number of requests for advice on "how to rid the house of bugs," came to us this season. The cyanide fumigation method, although it necessitates some danger and expense, is recommended and excellent results have been obtained.

**Chinch Bug** (*Blissus leucopterus* Say.). The country south of Glasgow where chinch bugs were abundant in 1911 was examined thoroughly again this season but no evidence of a reoccurrence of the pest could be found.

**Cabbage Louse** (*Aphis brassicae* Linn.). The cabbage louse was observed to be much more abundant than for some time past. Inquiries were numerous as to how this insect could be destroyed.

**False Chinch Bug** (*Nysius ericae* Schill). On account of being mistaken for the real chinch bug (*Blissus leucopterus* Say.) this insect causes alarm wherever found. Although it is a bad pest in gardens, in no way does it approach its eastern relative in the amount of destruction which it can cause.

**Oyster Shell Bark Louse** (*Lepidosaphes ulmi* Linn.). The oyster shell scale was present in less than normal numbers in the Bitter Root Valley in 1919.

**Sugar-Beet Root-Louse** (*Pemphigus betae* Doane). This was more abundant than it has been since 1916 and damage was done in the beet-growing districts of the state.

## MOTHS AND BUTTERFLIES (LEPIDOPTERA).

**Imported Cabbage Worm** (*Pontia rapae* Linn.). This caused an increased loss to the cabbage crop. Many calls for information on control methods were received and it is safe to say that this insect has not been so plentiful for several years past.

**Corn Ear Worm** (*Heliothis obsoleta* Fab.). This insect is becoming more important among the pests of eastern Montana and this

year was especially abundant. The first generation of worms attacks corn when only a few inches high while a later generation gnaws out the kernels at the tips of the ears.

**Mourning Cloak Butterfly** (*Eur Vanessa antiopa* Linn.). The larvae of this species, known as the "spiny elm caterpillar," eat the foliage of elm, willow, and cottonwood. Specimens were received from several localities where they were reported numerous.

**Cecropia Moth** (*Samia cecropia* Linn.). This large moth and caterpillar, often mistaken for the silkworm, was abundant at Glasgow, Union, and Sidney.

**Cutworms** (*Noctuidae*). Cutworms were as abundant as usual in gardens all over the state. Almost every kind of garden plant was attacked. In some places onions suffered severely from being chewed off near the surface of the soil.

**Pale Western Cutworm** (*Porosa grotis orthogonia* Morr.). Throughout twelve counties in the northern and eastern sections of the state, as well as in two counties of the central district, this insect caused enormous losses to the grain crop. In many cases what the worms partially destroyed the drought finished, but in as many other instances partial loss from drought was made complete by the ravages of the worms. This is a new pest in Montana and can not be combated by the ordinary methods employed against cutworms.

**Parnassius Butterfly** (*Parnassius smintheus* D. & H.). This beautiful butterfly was abundant in the mountainous sections of the state during a short period last summer.

**Tent Caterpillar** (*Clisiocampa* sp.). In some sections of northern and eastern Montana the wild rose foliage was completely destroyed before July 1 by this insect. Currant bushes, not protected with sprays, also suffered injury.

**The Oblique-Banded Leaf-Roller** (*Archip rosaceana* Harris). This year saw an increase of this insect in the Bitter Root Valley and a considerable amount of damage was done to the foliage of apple trees.

**Mediterranean Flour Moth** (*Ephestis kuehniella* Zell.). This insect is regarded as the most important of all pests which infest flour mills, warehouses, grain mills, and stores. The larvae feed upon all kinds of grain products. The fine web which they spin

causes a clogging of machinery besides their being the cause of introduction of filth into the materials. Fumigation, intense heat, or intense cold, are the remedies employed.

**Sugar Beet Webworm** (*Loxostege sticticalis* L.). Primarily a pest of sugar beets, this insect is also the cause of much injury to gardens and alfalfa in nearly all parts of the state. A slight decrease in its occurrence was noted this season. The destruction of thistle, which farmers in the northern part of the state wished to harvest for stock feed on account of drought conditions, has been a bad factor with this pest.

**Codling Moth** (*Cydia pomonella* Linn.). This well-known pest of the apple, formerly present only in the vicinity of Missoula, is becoming more widespread in the Bitter Root Valley. Elsewhere it is by all odds the worst insect enemy which apple growers have to fight and its establishment here will make necessary on the part of the orchardists more effort toward insect control.

#### FLIES (DIPTERA).

**Wheat Stem Maggot** (*Hylemyia cerealis* Gillette). This maggot, which bores through the central stems of wheat, was present again this season. The field in Yellowstone county, where the pest was first discovered in this state, was again a complete loss. Drought and cutworms in the northern part of Montana caused maggot injury to be largely overlooked.

**Onion Maggot** (*Phorbia ceparum* Meade). A slight decrease in the presenec of this insect was noticeable this year although in some localities considerable loss from it was incurred.

**Cabbage Maggot** (*Phorbia brassicae* Boche). No injury from this pest was reported this season.

**Currant Fruit Fly** (*Epochra canadensis* Leow.). A normal amount of damage to currants and gooseberries from this insect, which in some places has caused the growing of these crops to be abandoned, was reported to the State Entomologist.

**House Fly** (*Musca domestica*). House flies were exceptionally abundant during the past season and were the source of much annoyance, not to speak of their activity in the spreading of disease.

#### THE BEETLES (COLEOPTERA).

**The Common Meal Worm** (*Tenebrio molitor* Linn.). **The "Cadelle"** (*Tenebrioides mauritanicus* Linn.). These well known

insects of flour mills were reported from Great Falls. Losses due to these insects are largely preventable by fumigation.

**Flea Beetles** (*Epitrix* sp.). Flea beetles, attacking potatoes, tomatoes, and all kinds of garden plants just as they were coming out of the ground early in the season, were the source of much trouble and numerous complaints concerning them came to our attention from all parts of the state.

**Cottonwood Blotch Miner** (*Odontota* sp.). In many parts of Montana the cottonwood trees were severely injured by this insect which works between the surfaces of the leaves. On account of its mode of attack it can not be destroyed by ordinary spraying, and as its life-history is not thoroughly known other means which might prove effective for destroying it have not been found.

**June Beetles** (*Lachnosterna* sp.). These large beetles, the parents of white grubs, were observed in greater abundance than in former years.

**Colorado Potato Beetle** (*Leptinotarsa decemlineata* Say). Potato beetles were present in usual abundance. This is one of the few insects about which it may be said that methods of control are almost universally known. Paris green is the standard remedy but it is being replaced to a large extent by a cheaper arsenical, arsenite of zinc, which has been recommended during the past three years by the State Entomologist.

**Wireworms** (*Elaterridae*). Wireworms again occupied their place of importance among the grain pests of the state. Numerous inquiries were received as to what they were and how they could be destroyed.

**Confused Flour Beetle** (*Tribolium confusum* Duv.). A persistent pest of stored cereals, crushed feed, and other starchy food, was found in the feed bins of the poultry department of the Montana Experiment Station.

**Alfalfa Weevil** (*Phytonomus posticus* Gyll.). During the latter part of August a trip was made by automobile along the Oregon Short Line Railway from Dillon to Monida and through the Centennial Valley in an effort to determine if the alfalfa weevil was spreading into Montana. Careful search of alfalfa fields revealed no evidence of the pest in this territory, which is the most exposed of any part of Montana to migrations of this insect from infested regions of Idaho and Utah.



## CURRENT ENTOMOLOGICAL PROBLEMS

Some of the outstanding entomological problems of the present time are the following:

## PALE WESTERN CUTWORM

For several years we have been giving attention to cutworms in garden and field crops in Montana and gradually information of considerable value is being brought together. It is evident that there is a considerable variety of very destructive cutworms in the state, though in any one year the trouble is caused mainly by some one or another single species. The species which is best known in Montana is undoubtedly the army cutworm (*Chorizağrotis auxiliaris* Grote) which at times has caused extensive damage to fall wheat, but during the past few years there has appeared another which is quite as serious. This is the pale western cutworm (*Porosağrotis orthoğonia* Morr.) which has been mentioned in previous reports, but which we are, year by year, recognizing as more serious than we had suspected. Without much doubt over a million dollars' worth of grain was destroyed in Montana in 1919. Similar extensive damage occurred in Canada, just north of Montana, in the same year. There appear to be four reasons why this is an unusually injurious cutworm. (1) It has a long period of larval feeding extending from the middle of April for upward of two months. In this it contrasts strongly with the army cutworm which, when abundant, attracts attention in April and is all through feeding by May 10, or about a month in all. (2) Its damage is done so late in the season that it is too late to put in a crop of spring grain, as can be done sometimes when the grain has been eaten off by the army cutworm. (3) The pale western cutworm feeds under ground and we know of no practical way to kill it. Poisoned bran mash scattered thinly over the surface, so effective in controlling the army cutworm, does not affect this species. (4) It is not heavily attacked by parasites and continues year after year, gradually becoming more abundant and destructive. This cutworm has already become a serious problem in Montana and is receiving careful attention from this office. Under our Experiment Station research funds we are studying its habits and control. Excellent progress has been made and we have much information of value but no satisfactory remedy has yet been worked out.



## GRASSHOPPERS

The state collection of insects contains upward of one hundred species of Montana grasshoppers. With so many in the state it is not strange that one or another of them becomes abundant and injurious occasionally. In 1919 grasshoppers were more than usually injurious. Early in the season in May, reports began to reach the office of a species which was appearing in alarming numbers in the far eastern part of the state. Specimens accompanying inquiries turned out to be *Eritetix tricarianata*. Mr. Strand went to the locality where this grasshopper was injurious in June and advised with the farmers on its control.

Later in the season, the warrior grasshopper (*Cannula pelucida*) appeared in great numbers in most parts of the state. Our notes show it to have been present in great numbers in Gallatin, Missoula, and Beaverhead counties. In some localities this grasshopper was present in enormous numbers, migrating more or less in the air and congregating in the foothills around the valleys for egg-laying purposes, where the ground was literally covered with these insects busily engaged in boring into the earth and depositing their pods of eggs. There can be little doubt that some trouble will be experienced in 1920 from the grasshoppers originating from these eggs unless steps are taken to destroy either the eggs or the young grasshoppers soon after hatching. While on a trip of searching for the alfalfa weevil in the counties of Gallatin, Beaverhead, and Madison, Mr. Parker and Mr. Strand encountered large numbers of the same species which was very abundant in Montana sixteen years ago, namely, the big-headed grasshopper (*Aulocara elliotti* Thomas). This is a true grass-feeding species and its occurrence in large numbers is always important. It is one of Montana's worst insect enemies to range grass. In earlier years I have seen the range completely bared of grass by this species.

It is a remarkable thing that grasshoppers of the *Melanoplus atlantis* group which were very abundant and destructive in different parts of Montana as recently as 1918, and especially one year earlier, were not abundant in the state in any place so far as we know in 1919. In 1917 and 1918 when *Melanoplus* was abundant we observed that wherever these insects were numerous, parasitic flies were also present in great numbers. We believe that these flies

were the cause of the disappearance of the grasshopper. It is noted now that these parasitic flies are not present in connection with the outbreaks of the three grasshoppers listed above as injurious in 1919. We look upon this as indicating that the grasshopper difficulty will be continued through several years.

#### SUGAR-BEET WEBWORM

The common name, sugar-beet webworm, is not a satisfactory one for the insect (*Loxostege sticticalis* Linn.) which in recent years has been unusually abundant and has caused general apprehension among farmers and gardeners. During the season of 1919 this insect occurred in large numbers, though probably not quite as abundantly as during the preceding year, and was the occasion of a considerable amount of correspondence arising over the central and northern portions of Montana. There were two broods, the first appearing in May and early June and the second mainly in August. The injury done was chiefly to garden plants and to the Russian thistle. The presence of large numbers of this insect in grain fields, feeding on the Russian thistle, caused the farmers to become anxious in many cases and they wrote to us for information regarding what might be expected. It was feared that they would attack the grain when the Russian thistles were all gone. Experience has indicated that this webworm does not attack wheat and we were able to assure the farmers that no damage would be done. In some cases farmers were afraid to plant a new crop of grain because they knew that this insect was still in the soil from the preceding year, appearing there as larvae in long silken tubes, vertically placed in the soil. A number of letters were written to such farmers. Real injury, however, was done in gardens where beets, spinach, and a few other plants were eaten. This insect is capable of doing extensive damage in sugar beet fields.

#### ALFALFA

The alfalfa weevil (*Phytonomus posticus* Gyll.), which attracted the attention of the residents of Utah in the year 1904 and has spread and caused extensive loss to growers of alfalfa and stockmen in that state, has continued to spread to the northward. This very injurious insect has in a relatively brief time extended into parts of three states by direct spreading and during the same time has made two jumps, one into Colorado and another into western Idaho,

and is continuing to extend itself. According to information recently secured from the Bureau of Entomology office at Salt Lake the following counties in Idaho now have the weevil: Madison, Fremont, Bonneville, Bingham, Bannock, Bear Lake, Franklin, Oneida, Power, Cassia, Ada, Payette, Canyon, and Washington. One of these counties, Fremont, is the first county over the boundary from Montana. The weevil has been spreading perhaps fifty miles a year and without much doubt during the next year or two will be found to occur in Montana. It takes several years after being introduced for this insect to multiply in sufficient numbers to do real damage or to become sufficiently numerous to be discovered. It may be, therefore, that this insect already occurs undetected in Beaverhead, Madison or Gallatin County. The quarantine which we now have in force is effective only against the transportation of the weevil by rail. Such transportation would lead to its establishment in more or less remote localities, while by spreading overland it gradually spreads across the country.

With the coming of this insect into Montana we will be confronted by an entirely new and a very serious condition. This insect is primarily injurious to alfalfa and seriously reduces the tonnage, making it necessary to do a large amount of work in order to produce a profitable crop of hay. It is also of much importance to stockmen who are vitally interested in the alfalfa crop and the prices which they must pay. The coming of this insect into Montana will, therefore, be looked upon eventually as a serious matter.

The state of Idaho has recently removed the quarantine between the counties that are infested and those that are not in the state, thereby making it possible to move hay without restriction in that state. For this reason it will be necessary for Montana to establish a quarantine against the whole of Idaho in order that our own interests may be protected.

#### FOUL BROOD OF BEES

Our first knowledge of the presence of American foul brood of bees in Montana came in the spring of 1911 when a sample of this disease was sent in from Joliet. In the report of the State Entomologist for 1911 a recommendation was made that a law be passed providing for inspection and control. The nature of the legislation needed was pointed out in the ninth report. In the tenth report.

one year later, the subject was again briefly discussed, pointing out the situation and obvious needs. In nearly every report since that time we have called attention to the progress that the disease is making in its spread over the state, to the seriousness of the situation in the bee industry, and to the legislation needed. Nothing has been done.

Meantime, American foul brood disease has spread extensively and has entered practically every important honey-producing section of the state. Many beekeepers have been put out of business. Abandoned colonies of bees containing infectious material have been left where the bees died, continuing to spread the malady.

Representatives of the State Beekeepers Association called upon the State Entomologist in their official capacity in December, 1919, asking that this office cooperate with them in an effort to draw up a suitable law and once more make an effort to have it passed by the legislature. Accordingly, we are engaged in a review of the various bee laws in the United States and intend to have a bill ready before the next meeting of the legislature which shall have the combined support of the beekeepers of the state and of the State Entomologist.

#### THE CODLING MOTH (*CARPOCAPSA POMONELLA* LINN.)

The codling moth, the general insect enemy of the apple, has been present in Montana for at least twenty-five years, although isolated and confined largely to some of the older towns in which large apple trees are growing. Considerable attention was given to its habits and control in earlier years and various publications have been issued from this office. With the growth of the orchards in the fruit-growing sections and the development of the orchard industry, this insect has come into more prominence in recent years, due to the increase in its numbers under favorable conditions found on the larger trees. Fruit growers in western Montana have recently brought to the attention of this office the fact that the codling moth occurs in injurious numbers and that it is necessary to adopt energetic means of control. During the past year we received also letters from other parts of the state asking for assistance. We believe that the reason for the greater interest in this subject in 1919 was due to the unusually warm season. The weather dried off and became hot early in the year and made it possible for a destructive

second brood of the moth to develop. I do not expect that in other years the codling moth will be as serious in Montana as in some other states because of the natural limitations placed upon a second brood. It will, however, be sufficiently abundant to cause loss to fruit growers and energetic measures should be adopted to hold it in control. Fruit growers who have codling moth should spray for it. Most fruit growers have more than one insect pest or fungous disease and all should adopt a spraying program which should be consistently carried out year after year.

#### LEAF-ROLLER OF THE APPLE

Our attention has been called to the leaf-roller which appeared in injurious numbers on apple trees in the Bitter Root Valley in 1919. In some instances large numbers of trees were more or less completely denuded. It is impossible for us to say at the present time which one of two species is the cause of the trouble. The fruit-tree leaf-roller (*Archips argyrospila* Walker) is sometimes spoken of as the Colorado leaf-roller and growers locally have spoken of this as being that insect. However, in past years we have in a number of instances reared the oblique-banded leaf-roller (*Archips rosaceana* Harris) from the Bitter Root Valley. In some instances this latter insect has done rather serious damage to a limited number of trees. We shall have to wait for further developments of next season before we can determine which of these species is present. Satisfactory results in control can be secured by the use of miscible oils applied as a spray in the spring as soon as the weather warms up sufficiently to make spraying operations possible. It is not believed that this will be a pest which will continue year after year. Its history has been that it has occurred intermittently.

#### FLEA BEETLES

The season of 1919 was notable for the number of flea beetles which occurred. These minute beetles, with swollen hind legs enabling them to jump away when disturbed, are present more or less generally in small numbers each year but in the past season they occurred in such numbers as to cause rather extensive damage in gardens, on tomato and potato plants, and in sugar-beets. These insects work early in the season, destroying young plants soon after they come out of the soil. The stand in sugar-beet fields is sometimes seriously reduced by great numbers of flea beetles completely

destroying a large proportion of the seedlings. The following species were sent in during 1919 or have been collected in earlier years: *Epitrix suberinata*, *Phyllotreta albionica*, *Phyllotreta pusilla*, *Psylliodes punctulata*, *Crepidodera helvines*. *Epitrix suberinata* was the species most injurious during the past season.

#### SERIOUS LACK OF FUNDS.

Requests for information concerning insects and aid in controlling them have increased to such an extent that a full time assistant is now employed the year around. During the summer months this assistant goes about the state demonstrating methods of control and organizing control campaigns in counties where serious insect outbreaks occur. The services of this assistant are in constant demand throughout the summer and many thousands of dollars have been saved to the farmers of the state as a result of his work. During the winter months talks are given at farmers' meetings and at county agent conferences. Considerable time is also given to preparing information on insect control, making portable exhibits of insect life history, and developing the collection of state insects.

The total appropriation for the work of the State Entomologist is now only \$3300 a year. The salary of the assistant entomologist is \$2000, leaving only \$1300 for traveling expenses, student labor, scientific journals and supplies.

During the past summer the demand for aid in controlling grasshoppers was so great that our funds for traveling expenses were exhausted by midsummer and many requests for aid were refused because we had no means of getting about the state. The condition was so serious that a request for funds was made to the special session of the legislature. A bill carrying an appropriation of \$5000 was introduced by Senator Featherly and was passed by the Senate. The bill was not approved by the House Appropriation Committee and was consequently killed.

If this money had been provided thousands of dollars' worth of crops could have been saved last summer, and by scouting during the fall breeding grounds could have been located and the eggs or young 'hoppers destroyed. As the situation now stands we are facing what promises to be one of the worst grasshopper years in the history of the state. we are threatened with an invasion of the



alfalfa weevil, which is even now almost to our state line, and our working funds are not sufficient to carry out the routine work of an average year. Unless the State Entomologist's appropriation is materially increased, we will not be able to render the service expected from this office by the farmers of the state.



